INDUSTRIES OF THE FUTURE
BestPractices
Energy Smart Technologies for Today

ALLIANCE TO SAVE ENERGY

Justifying Utility and Steam Improvement Projects

Christopher Russell, Alliance to Save Energy

Very often, industrial facility managers must convince upper management that the investment in steam efficiency is an effort worth undertaking. The communication of this message can often be more difficult than the actual engineering behind the concept. The corporate audience will respond more readily to a dollars-and-cents impact than to a discussion of Btus, pounds of steam, and efficiency ratios. By adopting the financial approach, the facility manager relates steam efficiency to corporate goals. Collaboration with financial staff can yield the kind of proposal that is needed to "win over" the hearts and minds of the corporate officers who have the final say-so over capital investments like steam system upgrades.

Before laying out some recommendations for how to justify steam improvement projects, it is useful to understand the world as the corporate office usually sees it.

Understanding Corporate Priorities

Corporate officers are held accountable to a chief executive, a board of directors, and an owner (or shareholders, if the firm is publicly held). It is the job of these officers to create and grow the equity value of the firm. The corporation's industrial facilities do so by generating products with a market value that exceeds the cost of owning and operating the facility itself. Plant equipment—including steam system components—are assets that must generate an economic return. The annual earnings attributable to the sale of goods produced by these assets, divided by the value of the plant assets themselves, describe the *rate of return on assets*. This is a key measure by which corporate decision-makers are held accountable.

Financial officers, in particular, are conservative decision-makers. They are averse to risk and would rather not spend money on the plant itself, if possible. When forced to do so, financial officers will then seek investments that are most certain to demonstrate a favorable return on assets. When faced with multiple investment opportunities, the officers will favor those options that lead to both the largest and fastest returns.

This corporate attitude may impose (sometimes unpleasant) priorities on the facility manager: assure reliability in production, avoid unwanted surprises by sticking with familiar technology and practices, and contribute to cost control *today* by cutting a few corners in maintenance and upkeep. It is no wonder, then, that industrial decision-makers often conclude that steam efficiency is a "luxury" that cannot be afforded.

Fortunately, our story does not end here. What follows is a discussion of ways that industrial steam efficiency can save money and contribute to corporate goals while effectively reducing energy consumption and cutting noxious combustion emissions.

Measuring the Dollar Impact of Steam Efficiency

Steam efficiency improvements can move to the top of the list of corporate priorities if the proposals respond to distinct corporate needs. Corporate challenges are many and varied, which in turn opens up more opportunities to "sell" steam efficiency as a solution. Steam systems offer many opportunities for improvement; the particulars are provided in the technical Fact Sheets shared elsewhere in this Sourcebook. Once the selections are made, the task is one of dressing the proposals in corporate (i.e., "dollars-and-cents") language.

The first step is to identify and enumerate the total dollar impact of a steam efficiency measure. One framework for this is known as "life-cycle cost analysis." These analyses capture the sum total of expenses and benefits associated with an investment. The result—a net gain or loss on balance—can be compared to other investment options or to the anticipated outcome if no investment is made. As a comprehensive accounting of an investment option, the life-cycle cost analysis for a steam efficiency measure would include projections of:

- search and selection costs for seeking an engineering implementation firm
- initial capital costs, including installation and costs of borrowing
- maintenance costs
- supply and consumable costs
- energy costs over the economic life of the implementation
- depreciation and tax impacts
- scrap value or cost of disposal at the end of the equipment's economic life, and
- impacts on production such as product quality and downtime.

One revelation that typically emerges from this exercise is that fuel costs may represent as much as 96 percent of life-cycle costs, while the initial capital outlay is only three percent, and maintenance a mere one percent. These findings are true for boilers with a 20-year life operating at high rates of capacity utilization. Clearly, any measure that reduces fuel consumption (while not impacting reliability and productivity) will certainly yield positive financial impacts for the company.

Presenting the Economics of Steam Efficiency

As with any corporate investment, there are many ways to measure the economic impact of steam efficiency investments. Some are more complex than others, and proposals may use several analytical methods side-by-side. The choice of analyses used will depend on the sophistication of the presenter and the audience.

A simple (and widely-used) measure of project economics is the *payback period*. This is defined as the period of time required for a project to "break even." It is the time needed for the net benefits of an investment to accrue to the point where they equal the cost of the initial outlay.

For a project that returns benefits in consistent, annual increments, the *simple payback* equals the initial investment divided by the annual benefit. Simple payback does not take into account the

time value of money; in other words, it makes no distinction between a dollar earned today versus a dollar of future (and therefore uncertain) earnings. Still, the measure is easy to use and understand and many companies use simple payback for a quick "go/no-go" decision on a project. Five important factors to remember when calculating a simple payback:

- It is an approximation, not an exact economic analysis;
- All benefits are measured without considering their timing;
- All economic consequences beyond the payback are ignored;
- Payback calculations will not always find the best solution (for the two reasons immediately above) when choosing among several project options; and
- Payback does not consider the time value of money or tax consequences.

More sophisticated analyses take into account factors such as discount rates, tax impacts, the cost of capital, etc. One approach involves calculating the *net present value* of a project, which is defined in the equation below:

Net present worth (net present worth) = (Present worth of benefits) – (Present worth of costs)

Another commonly used calculation for determining economic feasibility of a project is *internal rate of return*, which is defined as the discount rate that equates future net benefits (cash) to an initial investment outlay. This discount rate can be compared to the corporation's interest rate at which it borrows capital.

Many companies set a threshold (or hurdle) rate for projects, which is the minimum required internal rate of return for a project to be considered viable. Future benefits are discounted at the threshold rate, and the net present worth of the project must be positive in order for the project to be a "go."

Relating Steam Efficiency to Corporate Priorities

Saving money, in and of itself, should be a strong incentive for adopting steam efficiency. Still, that may not be enough for some corporate observers. The facility manager's case can be strengthened by relating a positive life-cycle cost outcome to specific corporate needs. Some suggestions for interpreting the benefits of fuel cost savings include the following (finance staff can suggest which of these approaches are best for the current corporate climate):

- **A new source of permanent capital**. Reduced fuel expenditures—the direct benefit of steam efficiency—can be thought of as a new source of capital to the corporation. The investment that makes this efficiency possible will yield annual savings each year over the economic life of the improved steam system. Regardless of how the steam efficiency investment is financed—borrowing, retained earnings, or third-party financing—the annual savings will be a permanent source of funds as long as the steam efficiency savings are maintained on a continuous basis.

- **Added shareholder value**. Publicly-held corporations usually embrace opportunities to enhance shareholder value. Steam efficiency can be an effective way to capture new value. Shareholder value is the product of two variables: annual earnings and the price-to-earnings (or "P/E") ratio. The P/E ratio describes the corporation's stock value as the current stock price divided by the most recent annual earnings per share. To take advantage of this measure, the steam efficiency proposal should first identify annual savings (or rather, *addition to earnings*) that the proposal will generate. Multiplying that earnings increment by the P/E ratio yields the total new shareholder value attributable to the steam efficiency implementation.

- **Reduced cost of environmental compliance**. Facility managers can pro-actively seek to limit the corporation's exposure to penalties related to environmental emissions compliance. Steam efficiency, as total-system discipline, leads to better monitoring and control of fuel use. Combustion emissions are directly related to fuel consumption: they rise and fall in tandem. By implementing steam efficiency, the corporation enjoys two benefits: decreased fuel expenditures per unit of production, and fewer incidences of emission-related penalties.

- **Improved worker comfort and safety**. Steam system optimization requires on-going monitoring and maintenance that yields safety and comfort benefits in addition to fuel savings. The routine involved in system monitoring will usually identify operational abnormalities before they present a danger to plant personnel. Containing these dangers precludes threats to life, health, and property.

- **Improved reliability and capacity utilization**. Another benefit to be derived from steam efficiency is more productive use of steam assets. The efforts required to achieve and maintain *energy* efficiency will largely contribute to *operating* efficiency. By ensuring the integrity of steam system assets, the facility manager can promise more reliable plant operations. The flip side, from the corporate perspective, is a greater rate of return on assets employed in the plant.

Call to Action

A proposal for steam efficiency implementation can be made attractive to corporate decision-makers if the facility manager does the following:

- Identify opportunities for achieving steam efficiency.
- Determine the life-cycle cost of attaining each option.
- Identify the option(s) with the greatest net benefits.
- Collaborate with financial staff to identify current corporate priorities (added shareholder value, reduction of environmental compliance costs, improved capacity utilization, etc.)
- Generate a proposal that demonstrates how the steam efficiency project's benefits will directly respond to current corporate needs.